

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner: Lavinder, Jack. W.
Reissue Application of: Tiffany & Company
For: Cut Cornered Square Mixed-Cut Gemstone
Reissue Application No. 10/626,376
Reissue Filing Date: 07/24/2003
Original Patent No. 6,363,745
Original Patent Granted On: April 2, 2002
Art Unit: 3677
Confirmation No.: 2506

July 7, 2009

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

S i r:

THIRD SUPPLEMENTAL DECLARATION OF ROBERT S. GREEFF

I, Robert S. Greef, declare as follows:

1. I am the named inventor of the above-identified patent and re-issue application.
2. This *Third Supplemental Declaration* supplements my earlier Declarations filed in this application.
3. My education in the field of gemstones is as follows: I received a B.S. degree in Geology from Hamilton College. I have taken the education program from the Gemological Institute of America ("GIA") in 1989 and was awarded the title of Graduate Gemologist ("G.G."). The program involves training over the course of several months. The topics studied

("G.G."). The program involves training over the course of several months. The topics studied included the optical and physical aspects of gemstones, as well as classification of gemstones into different types of cuts.

4. I have been a Registered Supplier ("R.S.") with the American Gem Society ("A.G.S.") since about 1990. I was on the Board of Governors of the American Gem Trade Association ("A.G.T.A.") from 2002 to 2004.

5. I have been involved in the field of gemology for over 15 years.

6. I have been employed by Tiffany & Co. ("Tiffany") continuously since about 1990. During the time I have held the positions of diamond grader and diamond buyer. My present position is Director-Diamond Division, a position I have held since 1996.

7. My duties as Director-Diamond Division include selecting diamonds to be acquired by Tiffany for resale in their retail operations, including supervision of the evaluation and grading of those diamonds. I have also designed gemstones, including the gemstone that is the subject of the present patent.

8. The design of a gemstone is an intricate process which takes into account many different factors. The design should take into account the desired brilliance, both external and internal. External brilliance is the amount of light which impinges onto the top of the stone and reflects back, rather than being refracted inward. Internal brilliance is determined by light which enters the top or crown, gets reflected off the pavilion facets and back out through the crown as undispersed light. Another factor is dispersion, which refers to how the white light is broken up into its spectral colors. Dispersion is maximized when a ray of light is reflected totally from base facets and strikes the ground facets at the greatest possible angle. Another factor is scintillation which is an indication of the different light patterns obtained when the stone is moved under the

9. The design of a gemstone involves how to achieve the desired combination of brilliance, dispersion, and scintillation, and involves the careful design of the cut and facet arrangement in the crown and pavilion, along with the placement and angles of the facets. One of the most important factors in designing a gemstone facet arrangement to achieve the desired combination of brilliance, dispersion, and scintillation is the refractive index ("RI"). Each stone material has a characteristic RI and some have a double RI or birefringement. Diamond has an RI of 2.41 and corundum (which includes sapphire) has an RI of 1.76 and actually has double RIs at 1.76 and 1.77. Other important differences between different types of stones material include hardness and density. For example, diamond has a hardness of 10 on the Mohs' scale and corundum (which includes sapphire) has a hardness of 9. This may seem like a small difference, but there is actually a very big change in hardness from 10 to 9 compared to the change between other numbers in the scale. Depending on the method of hardness measurement used, a diamond can be 10 to 150 times harder than corundum at 9. Diamond has a density of 3.52 g/cm^3 and corundum has a density of 4.0 g/cm^3

10. The RI of a given stone material plays a big role in how the cut and facet arrangement will affect the brilliance, dispersion, and scintillation of a gemstone. A certain cut and facet arrangement for a diamond will produce much different brilliance, dispersion, and scintillation results than the identical cut and facet arrangement for a corundum material due to the different characteristic RIs. Due largely to the different characteristic RIs, one skilled in the art would not simply look to facet arrangements used for one type of material or shape for guidance or suggestion on how to make a cut and facet arrangement for another type of material and shape. Another important factor in designing a gemstone facet arrangement is the crystal structure of the material. Diamond has a "cubic" crystal structure having three crystal axes at

right angles (90 degrees) to each other and of equal lengths. In contrast corundum has a "hexagonal (trigonal)" crystal structure having three like planes of symmetry intersecting at angles of 60 degrees in the vertical axis.

11. I believe that the design of a gemstone cannot be made by simply taking facet arrangements of one existing design (which was selected based on gemstone material and shape), and then moving them around or modifying them based on selected features present in another gemstone design (which was also selected based on gemstone material and shape), absent a specific reason or motivation for doing so based on the designer's intent, type and shape of stone, and effect sought to be achieved. Each gemstone design is made for a particular purpose to carry out the designer's intent on achieving his desired balance of brilliance, dispersion, and scintillation, taking into account the RI and crystal structure of the stone as well as many other factors. Simply combining features of one stone with those of another would run contrary to the designer's intent of those existing stones, and contrary to the teachings.

12. I understand that the Examiner has rejected the claims of the present reissue application, alleging that Montana Burst discloses certain elements of the pending claims, except that Montana Burst does not disclose that the corner lengths of the crown and table are substantially less than the side lengths of the crown and table. Instead, the Examiner acknowledges that the lengths of all eight sides are the same in Montana Burst. The Examiner alleges that Grossbard U.S. Patent No. 4,020,649 discloses a gemstone having corner lengths less than the side lengths of the table and crown. The Examiner appears to allege that it would have been obvious to have corner lengths being substantially less than side lengths in Montana Burst based on Grossbard '649 which has a crown with corner lengths substantially less than side lengths.

13. I do not agree that it would have been obvious to one of ordinary skill in the art to make the invention defined in the subject claims based on the Examiner's proposed combination of Montana Burst and Grossbard '649. The Montana Burst is directed to a stone which is considered by those of ordinary skill in the art to be very different than that of Grossbard '649. Some of the different distinguishing features of the Montana Burst and Grossbard '649, are as follows:

<u>Montana Burst</u>	<u>Grossbard '649</u>
1. Directed to stone material having RI of 1.76 (corundum, such as sapphire) (Montana has sapphires but no diamonds), and to a stone material having a hexagonal crystal structure	Directed to diamond having having RI of 2.41, and a stone having a cubic crystal structure
2. Crown has unequal steps	Crown has equal steps
3. Octagon (8 equal sides)	Emerald (cut-cornered rectangular)
4. All eight pavilion sides are identical	Four pavilion sides are different from four pavilion corners, and two opposing sides have different lengths than the other opposing sides
5. All pavilion rib lines originating at girdle extend in a straight line	None of the pavilion rib lines extend in a straight line to culet
6. None of pavilion rib lines have a culet break	All pavilion rib lines have culet break

14. The Montana Burst is directed to corundum (sapphire) which has an RI of 1.76 and hexagonal crystal structure, much different from a diamond having an RI of 2.41 and a cubic crystal structure of Grossbard '649. The Montana Burst design was created for the "roundish" material to provide a roundish cut from the raw material, having eight equal sides. The Grossbard '649 design was created for a rectangular (emerald) material. The designs for these stones took the respective RIs and crystal structure of the raw material into account, and different designs were created based on the raw material shape, RI, crystal structure and designer's intent.

Based on my experience as a gemstone designer, I believe that it would not have been obvious to one of ordinary skill in the art to modify the design of the equal sided Montana Burst stone to have corners substantially less than the length of its sides like that in Grossbard '649.

15. The corundum (sapphire) crystal structure of Montana Burst is trigonal. Due to the trigonal crystal structure of the material, and the roundish shape of the row or rough material, the designer tried to obtain the most weight out of the rough and selected an equal octagon cut. One of ordinary skill in the art would not be motivated to change the outline of the finished cut in Montana Burst to have four comers substantially shorter than the sides like that in Grossbard '649, because this would substantially reduce the yield of the stone.

16. Corundum with its low RI of 1.76 has a much lower characteristic dispersion than diamond which has a relatively high RI of 2.41. In order to achieve the best overall combination of brilliance, dispersion and scintillation, the designer selected a crown having three non-equal height steps, the top being the smallest, the middle being the largest and the bottom being between the top and middle in terms of size. One skilled in the art would not be motivated to modify Montana Burst to have the Grossbard '649 crown for the reasons above, and also because having equal height steps in Montana Burst would severely reduce the brilliance of the corundum cut, which is already low due to its low RI of 1.76. The Grossbard '649 patent is directed to diamond material having a very high RI, and consequently a much higher characteristic dispersion, and having equal height steps can be employed, giving the diamond a classic look while still providing the diamond with a substantial dispersion.

17. In summary, due to the type of material (corundum) used in Montana Burst, with its characteristic crystal structure, RI and dispersion, and due to the shape (roundish) of the rough material, and its selected unequal height steps, one skilled in the art would not be motivated to

change the shape of the finished cut from equal octagon to cut-cornered with four sides shorter than four sides, and equal height steps like that of Grossbard '649.

18. In view of the differences in stone type, shape, crystal structure, RI, pavilion facet arrangement and pavilion rib line arrangement, I believe that one skilled in the art views the Montana Burst and Grossbard '649 as different designs achieving different objectives and that one would not have been motivated to modify the Montana Burst to have corner lengths substantially less than the side lengths. Further, even if a person of ordinary skill in the art was selectively given the Montana Burst and Grossbard '649 and was asked to arrive at a modified design based on these two references, I believe that there is no reason why that person would have arrived at a modification proposed by the Examiner, instead of some other modification or modifications.

19. It is my understanding that to determine whether a gemstone design would have been obvious, one must look at the prior art references as a whole to see what they suggest about making a proposed combination, if any. Assuming one started with the Montana Burst, I believe that one of ordinary skill in the art would first ask himself whether there would be any motivation to make any modifications to the stone, or to combine features of this stone with another stone, based on a host of features including the RI and crystal structure of the stone material. The Montana Burst goes to great lengths to detail a facet arrangement and cutting angles for the particular Montana material with an RI of 1.76 (corundum, such as sapphire, not diamond), based on the intent to achieve a particular stone having a certain brilliance, dispersion and scintillation, and given the crystal structure and shape of starting material (round). I believe that there is no reason why one would seek to deviate from the detailed specification for this stone. I believe that the same can be said for the specifications of the Grossbard '649 stone.

20. I believe that, without reference to the claim language (which provide a blue print or roadmap of the invention), one skilled in the art having access to the Montana Burst reference and all of the other prior art would have no reason to then look to the Grossbard '649 patent (relating to a cut-cornered rectangular diamond) for possible ways to modify the Montana Burst corundum stone. As described above, there are at least six major differences between the Montana Burst and Grossbard '649 which together lead one skilled in the art to view these stones as different. I believe that there is no teaching or suggestion or other information sufficient to provide a motivation to one skilled in the art to modify the Montana Burst stone to have corner lengths substantially less than each of the side lengths.

21. I understand that Claim 1, as well as the other subject independent claims, recite the limitation "cut-cornered". I understand that this term means that the corners are shorter than the sides, to form "sides" and "corners". In Montana Burst, all of the "sides" are indeed "sides", because they are the same length, and none are "corners" as the term is used and was used as of the December 1, 1998 filing date. Montana Burst is not a "cut cornered" stone. I believe that one of ordinary skill in the art would have the same understanding of this term as of at least December 1, 1998, and understand that Montana Burst is not a "cut-cornered" stone.

22. I understand that independent Claim 1, as well as the other subject independent claims, recites that each of the four corner lengths is substantially less than the four side lengths. Montana Burst does not show this feature, but merely shows eight equal length sides.

23. The presently claimed invention provides a facet arrangement which receives incident light through various facets including the table, refracts that light according to the RI of the material and further directs the light throughout the interior of the stone based on the particular facet arrangement, and light is directed outward to provide a characteristic brilliance,

dispersion, and scintillation. Accordingly, each aspect of facet arrangement provides a mechanical function and purpose.

24. Since 1999, Tiffany has been selling a jewelry line under the trademark LUCIDA having gemstones which have the features shown in the drawings, and described by the claims, of the above referenced U.S. Patent No. 6,363,745 and the present reissue application. Upon information and belief, the LUCIDA jewelry line has enjoyed significant commercial success, while at the same time not causing any significant detrimental effect on Tiffany's other jewelry lines having other gemstone cuts such as round brilliant. Upon information and belief, the commercial success of the LUCIDA line has been due to the unique gemstone cut of a step crown and brilliant pavilion according to the presently-pending claims of the reissue application. Upon information and belief, over 90% of the gross sales of the LUCIDA line is for diamond gemstones, with a much smaller (less than 10%) based on gemstones which are not diamond.

25. The Lucida jewelry line contains essentially only gemstones which are described by the subject claims, so that virtually all of the value of the Lucida jewelry line is attributable to the Lucida gemstones covered by the subject claims.

26. The Montana Burst gemstone is in the form of a symmetrical, eight equal-sided octagon. Due to its eight equal-sided symmetry, gemstone designers could generally predict the internal light reflection patterns, and the resultant fire, brilliance, and scintillation from the crown of the stone. However, a gemstone which has an unsymmetrical shape (for example, because all of its sides are not equal), presents a completely different structure in terms of predicting the internal light reflection pattern, and the resultant fire, brilliance, and scintillation from the crown of the stone.

27. Unlike the Montana Burst stone which was symmetrical and had eight equal sides, I was looking for something different and conceived of a mixed-cut gemstone having an asymmetrical design with sides longer than corners.

28. During the time period when I conceived and reduced to practice the gemstone design which is the subject of the present claims, the present-day optical ray tracing simulation programs were not available, so gemstone designers did not have the tools and benefits of present-day gemstone designers. I did the best I could in predicting what characteristics a gemstone would have. Before I actually cut rough material into a finished gemstone according to the invention, I had certain initial expectations as to what fire, brilliance, and scintillation characteristics my conceived gemstone would yield.

29. After I conceived the subject gemstone, I cut rough material into a gemstone with facets according to my conception, which was an expensive and time-consuming process. I eventually made a gemstone according to the subject patent claims and drawings. The gemstone exceeded my initial expectations in terms of the fire, brilliance, and scintillation characteristics. I also showed the gemstone cut to others, and they were also very impressed with the fire, brilliance, and scintillation, and told me that the gemstone cut exceeded their expectations.

30. I hereby declare that all statements made herein on my own knowledge are true and that all statements made herein on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine, or imprisonment, or both, under §1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the subject patent.

Date: _____

Robert S. Greeff

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Date: 7/7/09

Robert S. Kreeff